

Real-time Online Communications: ‘Chat’ Use in Navy Operations

Authors:

Nancy J. Heacox
heacox@pacific-science.com
Pacific Science & Engineering Group, Inc.
9180 Brown Deer Road
San Diego, CA 92121

Ronald A. Moore
ramoore@pacific-science.com
Pacific Science & Engineering Group, Inc.
9180 Brown Deer Road
San Diego, CA 92121

Jeffrey G. Morrison
jmorriso@spawar.navy.mil
SPAWAR Systems Center, San Diego
53560 Hull Street
San Diego, CA 92152-5000

Rey F. Yturralde
rey.yturralde@navy.mil
SPAWAR Systems Center, San Diego
53140 Gatchell Road
San Diego, CA 92152-7400

Point of Contact:

Nancy J. Heacox
heacox@pacific-science.com
Pacific Science & Engineering Group, Inc.
9180 Brown Deer Road
San Diego, CA 92121

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Real-time Online Communications: ‘Chat’ Use in Navy Operations

Nancy J. Heacox and Ronald A. Moore
Pacific Science & Engineering Group, Inc.
9180 Brown Deer Road
San Diego, CA 92121

Jeffrey G. Morrison and Rey Yturralde
SPAWAR Systems Center, San Diego
53560 Hull Street
San Diego, CA 92152

Abstract

The ability to conduct a real-time “conversation” online has become a ubiquitous component of today’s communications environment. Commonly referred to as “chat”¹ or “instant messaging,” this mode of communication provides users with a format that facilitates multi-tasking conversation with other duties. Chat has also become a critical tool in military command and control, as evidenced by its extensive use during both Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). A recent survey of fleet users² during OIF provided detailed information and insights about chat usage patterns and warfighter requirements for chat tools. The results revealed positive and negative issues related to chat use in an operational environment. Issues included the need to monitor multiple chat rooms simultaneously; the lack of consistent business rules; requirements for chat rooms with different access privileges; and requirements for chat histories. The ability to work near real-time with peers is perceived to be a tremendous boost to productivity and greatly facilitates communication, cooperation, and coordination.

This paper discusses the results of the survey and highlights areas where human factors and technology interventions may be able to facilitate chat use within US military command and control.

Introduction

Chat Systems

The ability to conduct a real-time conversation online has become a ubiquitous component of today’s communications environment. Commonly referred to as ‘chat’ (when used for group communications) or ‘instant messaging’ (when used person to person), this mode of communication provides users with a format that facilitates multi-tasking, i.e., monitoring or conducting multiple conversations over an extended period of time while still attending to other duties.

¹ The term ‘chat’ will be used to refer to the entire class of real-time, on-line communication tools.

² This work was sponsored by the Office of Naval Research as part of the *Knowledge Web Technologies Future Naval Capabilities* and *Command 21* programs, and was performed under contract with, and at the direction of, the Space and Naval Warfare Systems Center, San Diego.

Chat systems – or more precisely, “Internet Relay Chat” (IRC)³ systems – are Internet-based systems for synchronous or near-synchronous conversation in real time. Chat rooms⁴ allow group members to engage in “real-time” discussion without needing to be in the same physical location (Coopman, 2001). Participants engage in text-based interaction that resembles the immediacy of in-person, face-to-face encounters, though not necessarily with the same pressures or necessity to respond as while participating in a typical voice conversation. Users interact with one another by typing messages on a computer keyboard and reading responses from conversation participants on their computer screens. A history of previous conversation is often available as long as the chat room remains open, and the user is logged into it. Participants may conduct simultaneous conversations in the same chat room, or multiple chat rooms can be monitored or participated in by opening more than one chat window or application at the same time. Online chatting does not require that participants respond immediately and therefore supports asynchronous communications as well. However, to be used effectively, chat replies must be sent within a relatively short period of time of one another else the participants may lose the “thread” (i.e., the order and flow) of the conversation and become confused. As a result, chat users often do not have much time to think about what to say or how to say it.

Chat in the Navy

Chat⁵ has gone from a novelty application used mostly for recreational purposes to occupying a central position in some work settings. For instance, within the U.S. Navy, chat systems are used in conjunction with e-mail and shared databases to coordinate logistics orders and inventories (Cahlink, 2003). Since 1994, the Navy has approved and made available IRC-compliant chat on the Global Command and Control System – Maritime (GCCS-M). Its use by operational personnel was largely confined to technical support issues until late 2001. Then, during Operation Enduring Freedom (OEF) in Afghanistan, a milestone in the Navy’s use of chat was reached. Chat enabled hundreds of operators to join real-time online conversations (Jara & Lisowski, 2003). However, it was not until 2003 during Operation Iraqi Freedom (OIF) that the use of chat became the mainstream communications vehicle for up to the minute command and control. Over the evolution of both OEF and OIF, the numbers of users and chat rooms increased rapidly to support operational requirements. Approximately 2,500 operators used over 400 chat rooms in OIF to exchange tactical information and provide situation updates, in addition to troubleshooting technical issues.

Jara and Lisowski judged from the OIF experience that IRC-compatible chat has proven “to be an excellent tool to support various areas of mission planning, execution, and command and control” (2003, p. 55). Its benefits are low bandwidth requirements and support for multiple distributed concurrent users. However, anecdotal reports suggest that there may be important operational issues that are not addressed by IRC-compliant products, including:

- No standardized automated logging of conversation content

³ IRC is an established Internet protocol. While this is the industry standard, there are some products that provide capabilities for real-time online conversation that are not IRC-compliant.

⁴ A chat “room” is a virtual meeting location on the Internet that has been established to facilitate conversation on a particular topic, e.g., a weather chat room would be used by its participants to discuss weather-related issues.

⁵ The term ‘chat’ will be used to refer to the entire class of real-time, online communication tools.

- No authentication of session attendees
- No search functionality for topics or discussions
- No timestamps on entries
- No filtering capability

Various IRC-compliant products address one or more of these shortcomings; however, some have much higher bandwidth requirements, support many fewer concurrent users, and/or have limited functionality and interoperability. In addition, some popular IRC-compliant shareware products⁶ (e.g., mIRC) provide sophisticated tools such as logging and timestamp capabilities; but are not approved for use on Navy workstations and networks.

Chat Survey

Data Collection Instrument

In order to have an empirical basis for responding to the communications requirements and capabilities in the fleet, it was deemed worthwhile to capture the experiences and opinions of chat users from OIF in a systematic manner. Toward that end, a Web-based survey was conducted of chat usage in the fleet. The survey was hosted on the Secret Internet Protocol Router Network (SIPRNET) so that personnel could respond to the survey from the convenience and privacy of their own workstations. The survey consisted of approximately 40 multiple choice and open-ended items. The following high-level issues were addressed:

- Chat user profiles
- Chat usage patterns
- Needed chat functionality
- Problems and successes associated with chat use

Demographics

One hundred eighty-three respondents completed the survey in May 2003. Their replies were submitted directly to a database, while (optional) demographic data was submitted directly to a second, unrelated database. (Two databases were used so that users' responses were not associated with their demographic information.) The starting date of the respondents' most recent deployment date ranged from November 2001 to April 2003. Other respondent demographics were as follows:

⁶ ‘Shareware’ is software that is freely available on the Internet. A user may try the software free of charge; if he likes and uses it, he is expected to send in the fee requested by the author (often individuals vs. corporations), whose name and address will be found in a file distributed with the software. mIRC was developed by Khaled-Mardam-Bey, a freelance, self-employed software developer.

Commands	
Cruisers & Destroyers	39%
Carriers	38%
Afloat Staffs	18%
Support Ships & Activities	3%
no answer	2%

Ranks & Rate	
Jr. Officer (CWO, O1 – O4)	34%
Jr. Enlisted (E2 – E5)	31%
Sr. Enlisted (E6 – E9)	28%
Sr. Officer (O5 & O6)	3%
no answer	3%

Results

Usage. The majority of respondents reported heavy chat usage while deployed—6 or 7 days per week and 7 or more hours per day.

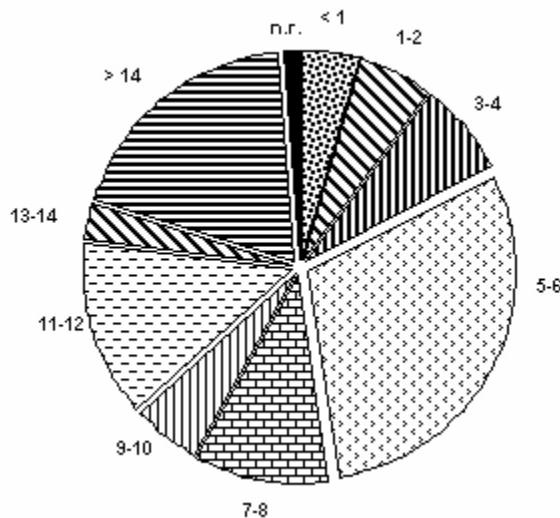


Figure 1. Hours per day respondents log into Chat

Comparative results by sub-groups

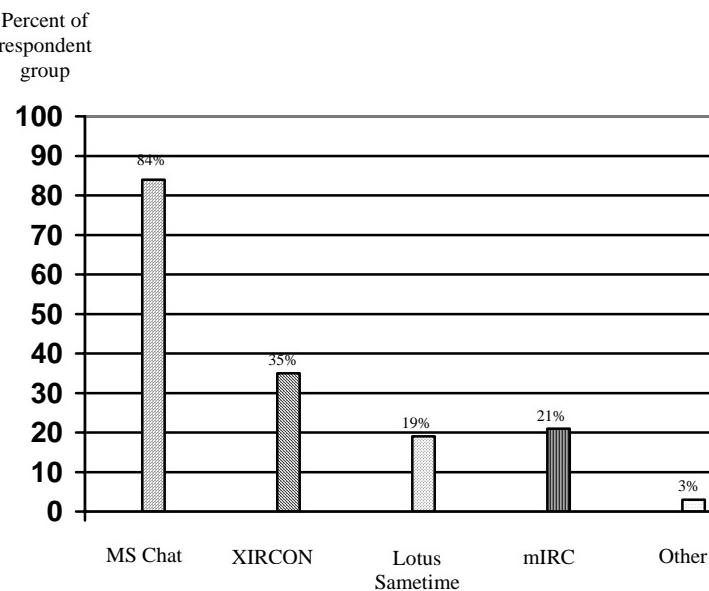
- Officer – Enlisted:
 - The number of days per week logged into chat was similar across both sub-groups as for the total group.
 - The modal number of log-in hours per day for Officers is 5-6 (51% of Officers)
 - The modal number of log-in hours per day for Enlisted is 14+ (28% of Enlisted)
- Junior – Senior staff:
 - The number of days per week logged into chat was similar across both sub-groups as for the total group
 - The modal number of log-in hours per day for Junior staff is 5-6 (33%)
 - The modal number of log-in hours per day for Senior staff is 14+ (32%)

Multiple simultaneous chat sessions. Nearly ¼ of respondents said they consistently monitored 5 or more chat sessions. They also reported simultaneously participating in multiple chat sessions; the mean number of sessions concurrently monitored and participated in was reported to be 6.

Comparative results by sub-groups

- Officer – Enlisted:
 - The mean number of concurrent sessions was similar across Officer and Enlisted sub-groups as for the total group.
- Junior – Senior staff:
 - The mean number of concurrent sessions was similar across Junior and Senior staff sub-groups as for the total group.

Multiple chat applications. Forty-four percent of respondents reported using multiple chat applications, with Microsoft Chat being the most popular tool. Another approved, IRC-compatible product, XIRCON,⁷ was the second most popular tool. Lotus Sametime, a non-IRC-compatible product that allows operators to converse with coalition partners on CENTRIXS⁸, was used by approximately 1 in 5 respondents. Interestingly, a similar number of respondents reported using non-approved mIRC, presumably because of its logging and timestamp capabilities. A combination of factors apparently influenced the use of specific tools, including what tools were available to all the participants in a particular session, and the types of military operations a specific group of users were engaged in. The analyses below consider which chat tools were being used by specific commands. The use of multiple chat tools, even when there was a common underlying chat protocol (e.g. IRC) suggests that one application solution does not meet all users' needs. Survey items regarding important capabilities within the chat application allowed for the investigation of these needs.



⁷ Available on UNIX-based GCCS machines.

⁸ The Combined Enterprise Regional Exchange System, a secure network that enables U.S. personnel to communicate with allied personnel in designated countries.

Notes: Summed percentages exceed 100% because 44% of respondents reported using more than one tool.
‘Other’ includes MS Whiteboard, Coalition Wide Area Network (COWAN), and Perfectnode

Figure 2. Chat tools used on deployment

Comparative results by sub-groups

- Officer – Enlisted:
 - More Enlisted than Officers reported using XIRCON and mIRC
 - More Officers than Enlisted reported using MS Chat and Lotus Sametime
- Junior – Senior:
 - Results were similar across Junior and Senior sub-groups as for the total group
- Commands (NOTE: there was a very low number of respondents in the Support sub-group):
 - MS Chat was used by at least 50% of all command groups
 - 100% of Afloat Staffs, 86% of Carriers, 78% of Cruisers & Destroyers, 50% of Support
 - XIRCON was used by 28% - 50% of command groups
 - 50% of Support, 41% of Carriers, 32% of Cruisers & Destroyers, 28% of Afloat Staffs
 - Lotus Sametime was used by 0 – 44% of command groups
 - 44% of Afloat Staffs, 16% of Cruisers & Destroyers, 10% of Carriers, 0% of Support
 - mIRC was used by 13 – 33% of command groups
 - 33% of Support, 23% of Carriers, 22% of Cruisers & Destroyers, 13% of Afloat Staffs

Important chat capabilities. The following capabilities were rated as ‘Important’⁹, by more than 2/3 of respondents:

- Ability to view multiple rooms simultaneously,
- Ability to broadcast to multiple people simultaneously,
- Ability to communicate with a limited set of listeners within a room (e.g., one-on-one dialogue) (this is commonly referred to as “Whispering”)
- Ability to monitor a conversation between multiple people within a room.

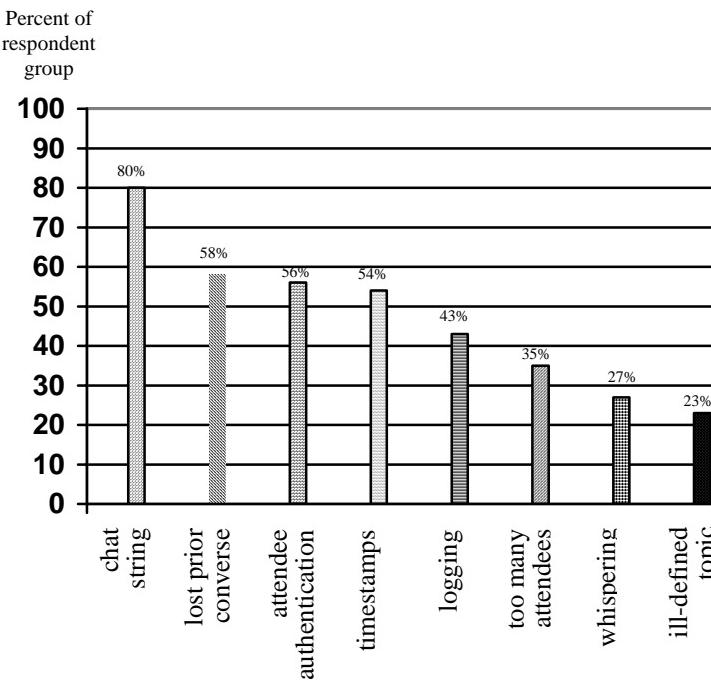
Comparative results by sub-groups

- Officer – Enlisted:
 - Results were similar across Officer and Enlisted sub-groups as for the total group
- Commands:
 - Results were similar across Commands as for the total group

Issues of concern. Respondents were queried about many of the operational issues that have been suggested as deficit areas with IRC-compliant chat. “Losing chat strings when connectivity is lost” was the top rated chat issue of concern. 80% of respondents replied that losing chat strings during chat sessions has negative consequences. Also, it is noteworthy that, while “whispering”

⁹ Scale values were ‘Important,’ ‘Somewhat.’ ‘Not Important,’ and ‘Not Applicable.’

was rated as an important capability by at least 70% of the total respondent group and most sub-groups, it was also reported as problematic by roughly 25% of the groups. This was apparently due to its overuse, as well as the notification to all members of a group every time a whisper took place. Anecdotal reports further suggested that excessive whispering, and complaints about it, were a frequent reason for a subset of users to create a derivative chat room for their exclusive use away from the larger chat group. These results suggest there is a perceived requirement for both private and semi-private chat rooms to support the “official” public chat rooms.



Note: Summed percentages exceed 100% because 81% of respondents rated multiple issues as problematic.

Figure 3. Chat issues of concern

Comparative results by sub-groups

- Officer – Enlisted:
 - The same pattern (i.e., the same rank order of issues) was seen with Officer and Enlisted sub-groups as with the total group
 - In general, more Officers than Enlisted reported that these issues were problematic, with the exception of *ill-defined topic*, which more Enlisted reported as problematic
- Junior – Senior:
 - The same pattern (i.e., the same rank order of issues) was seen with Junior and Senior sub-groups as with the total group
 - The largest difference between Junior and Senior sub-groups: *whispering* was reported as problematic by more Senior staff than Junior staff

- Commands (NOTE: there was a very low number of respondents in the Support sub-group):
 - A similar pattern (i.e., a similar rank order of issues) was seen with most Command sub-groups as with the total group.
 - The largest difference among Commands: Afloat and Support staffs rated *lost prior conversation* (“lack of access to the conversation occurring just before logging into a room”) as more problematic than did other groups.

Changes to the way of doing business. Respondents declared that chat has changed their way of doing business.

- For many, chat has replaced voice reporting as the preferred method for passing information to both peers and superiors. The majority of users reported this in a positive light; however, a minority were concerned about too much reliance on chat vs. voice.
- The ability to work near real-time with distributed peers is perceived to be a tremendous boost to productivity.

Success during operations: Major operational successes were reported:

- A non-intuitive observation was made by several participants in that they thought that chat served to remove or lessen the language barriers normally associated with listening to radio circuit-based conversations. Unlike traditional radio circuits that often experience static and other audio noise, chat was always clear and easy to read. Additionally, because chat is text-based instead of spoken conversation, it often lessens issues associated with verbal accents and language fluency, thus facilitating coalition operations.
- Scheduling and coordinating with individuals and units at great distances is crucial in modern military operations, and was perceived as significantly more effective with chat because an entire community of interest could be addressed at the same time. Additionally, critical information shared via chat was more persistent than spoken conversation in that it was available for review in the chat history thread as long as the chat room remained open and the user remained logged into it. In other words, chat users could quickly refer back to the chat thread to help them recall or understand what had been shared with the group.

Comparative results by sub-groups

- Benefits for chat by Commands (Successes that were uniquely mentioned by Command sub-groups):
 - Afloat staffs: Sharing more types of information such as lessons learned and best practices.
 - Carrier staffs: Supplementing geoplot data.
 - Cruiser/Destroyer staffs: Recording of conversations for later reference (with cut and paste).

Problems during operations: However, problems during operations were also reported:

- Loss of connectivity, and lack of permanent conversation logs to assuage the interruption.

- Whispering and then forgetting to broadcast to those with a need to know.
- Orders given over chat, especially in the “whisper” mode.
- Lessened ability to maintain situation awareness when monitoring multiple chat sessions.

Comparative results by sub-groups

- Commands (Problems that were uniquely mentioned by Command sub-groups):
 - Afloat staffs: Automatic (and erroneous) “booting out” of chat participants from a chat room.
 - Carrier and Cruise/Destroyer staffs: Lack of business rules for use.
 - Cruise/Destroyer staffs: Confusion over tactical signals/orders, passing of information without a thorough evaluation (e.g., rumors), and use of chat for personal conversations.

These chat survey results confirm observations and user feedback from command and control exercises (Oonk, Smallman & Moore, 2000; Oonk, Rogers & Moore, 2001) and military operations (Schermerhorn, Oonk & Moore, 2002) and suggest that improvements are needed.

Recommendations

Based on the results of this survey and discussions with fleet users, numerous recommendations for improvement were developed regarding chat tools, and the business rules and policies associated with how chat is used. The following are a sampling of specific recommendations regarding chat tools and chat tool use that were developed.

Chat Tool Training

Many *survey respondents reported receiving no training at all on chat tools or chat tool use*. Since several chat tools are currently in use, training should be developed for each approved tool. A particularly high priority is for the creation of business rules to guide the use of chat for operational purposes. Training should be provided for the business rules, policies, and procedures associated with chat, in addition to training in the “mechanics” of chat tools. Formal documentation should be complemented by a mechanism capturing best practices and lessons learned.

Access and Access Control

Two major improvements are required with regard to chat tool access. The first is giving users the ability to better control or limit who has access to their chat rooms. Further, there is a need to clearly state and share among all chat users the specific purpose of the chat room (who it was created for, e.g. a community of users, and why). Often, when one room gets too crowded, users simply create a new room where a subset of the participants can continue their discussion. This leads to a proliferation of rooms – and makes it difficult to know which rooms to visit the next time one needs to communicate (i.e., the room you visited yesterday may no longer be the room you need since its occupants have created and moved on to another room...).

The second major access-related improvement required is to provide chat capability to everyone who needs it. Various services and allied coalition forces use different, often incompatible chat tools, and some users don't have access to chat tools at all. Thus, users sometimes must resort to traditional – and often less efficient – means to communicate.

Time Stamping and Logging Capabilities

While chat tools are usually used for synchronous communications, chat tool users report that chat is very useful when used asynchronously as well. By reading through the thread of a previous conversation, one can quickly gain awareness of what has occurred over time. Additionally, it would be helpful if each entry / statement is time stamped so that it is explicit when each statement was made. Unfortunately, most chat tools do not currently time stamp conversation entries, or automatically log conversations.

Search Tools

Due to the number of chat rooms currently in use (and the likelihood that this number will increase over time) it is extremely difficult to quickly locate a conversation of interest. Search tools are required that can quickly search for key words and conversation threads across the hundreds of chat rooms currently in use. Ideally such a search would also search across time, so that users could determine when as well as where communities of interest might be meeting to address different aspects of operation.

Official / Permanent Chat Rooms and Informal / Temporary Chat Rooms

Many survey respondents felt the need for a differentiation between official and/or permanent chat rooms (similar to today's radio circuits) where official communications would be conducted and recorded, and informal and/or temporary chat rooms (similar to phone conversations and private emails) where "working" conversations could be held. This underscores a larger issue with regard to the need for public, semi-public, and private virtual workspaces that allow different user enclaves to emerge and evolve from the larger, official communities of interest. Clearly, such capabilities would also require the development of business rules and practices to support their use.

Summary

These results illustrate how web-centric warfare is transforming the way that warfighters conduct command and control, and show how on-line surveys can be an effective tool in understanding this transformation and help describe and quantify how web-centric technologies are being used. The survey confirmed anecdotal reports that chat tools are being used heavily, with 5-14 hours per day being spent by the typical warfighter, who often monitors 5 or more different chat rooms simultaneously. Chat has clearly become a central pillar in modern command and control. The significant differences in both features and usability issues found among the different groups of users in this survey suggests that developing or adopting a "one size fits all" chat tool and

associated business rules and policies will not be desirable as the result would be non-optimal for most warfighters. A better approach would be to adopt a ubiquitous protocol for chat, and select a set of tools that are tailored and/or tailorable to meet the operational needs of the different groups of warfighters. Both tools and business rules need to address the requirement for public “official” standing chat rooms, as well as for ad hoc private and semi-private chat rooms. History of conversations over time is a major aspect of chat usage, both for understanding context as well as for maintaining a record of the discussions that become the basis for operational orders. Overall, it is clear that a comprehensive knowledge management approach is required to better develop and use chat tools in the fleet—one that incorporates business rules with technological capabilities, and supports the on-going evolution of both formal business rules and best practices regarding warfighters’ use of chat and related web tools to achieve improved command and control.

References

- Cahlink, G. (2003, April 4). Navy relies on technology to streamline supply operations. *Government Executive Magazine*. Retrieved February 4, 2004, from <http://www.govexec.com/dailyfed/0403/040403g1.htm>
- Coopman, S. (2001). *Technology and small groups*. Retrieved February 4, 2004, from McGraw-Hill Higher Education website:
http://www.mhhe.com/socscience/comm/group/students/new_com.htm
- Heacox, N. J. (May 2003). *Survey of chat usage in the fleet: Results*. San Diego, CA: Pacific Science & Engineering Group.
- Jara, T. & Lisowski, M. (Sep 2003). Don’t silence Navy chat. *Proceedings*, 129(9), 52. Annapolis, MD: United States Naval Institute.
- Oonk, H. M., Rogers, J. H., & Moore, R. A. (2001). *Knowledge Web Concept and Tools: Use, Utility, and Usability During the Global 2001 War Game*. San Diego, CA: Pacific Science & Engineering Group.
- Oonk, H. M., Smallman, H. S. & Moore, R. A. (2000). *Usage, Utility, and Usability of the Knowledge Wall During the Global 2000 War Game*. San Diego, CA: Pacific Science & Engineering Group.
- Schermerhorn, J. H., Oonk, H. M., & Moore, R. A. (2002). *Knowledge Web Use During Operating Enduring Freedom*. San Diego, CA: Pacific Science & Engineering Group.